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SUBSTITUTE SPECIFICATION

PELLETT OF PLANT SEED, A METHOD OF PELLETIZATION AND A CULTIVATION METHOD OF PLANTS USING THE SAME

TECHNICAL FIELD

[0001] The present invention relates to a pellet of plant seed, a pelletization method and a cultivation method of plants using the same. More particularly, the present invention relates to a method for the pelletization of plant seeds by forming a mixture containing peatmoss, drying the mixture and inserting a plant seed into the mixture and forming a pellet containing the plant seed . The present invention is also concerned with the cultivation of plants by sowing the pellets containing plant seeds in the soil.

BACKGROUND ART

[0002] The sowing and cultivation of plant seeds have been developed through research involving many steps however, there are still problems to be solved. The cultivation of plants comprises many steps such as sowing, raising seedling, fertilization and controlling noxious insects and requires much labor, high costs and time. Also, it requires scientific and experiential knowledge for the treatment of plant seed.

[0003] Peatmoss, often used in the technical field of the present invention, is an organic material, e.g., an accumulation of rotten reeds of swamp or marsh found in a cold region. The peatmoss has 15 times the moisture absorption compared with dry conditions and an excellent aeration. In addition, it is light and has no side effects, such as a

chemical reaction upon fertilization, so that it is generally used in the sowing of plant seed, in the production of seedlings and in cultivation.

[0004] On the other hand, in the technical field of the present invention, a pellet is prepared by coating surface of the plant seed with a mixture comprising nutrients for germination and growth promotion of plant seed. An object of the pelletization is an enlargement for the mechanization of micro-seeds and a protection from harmful insects or bacteria for germination promotion and seedling. In the prior art, a pellet of plant seed is generally prepared by coating the surface of the plant seed with treated material, severally. A pellet with plant seed prepared by this method is not effective. In addition, it creates an economical problem because the material for pelletization does not function as soil, so it is necessary to cover with earth again after sowing seed.

[0005] The peatmoss used as a material for pelletization reduces the labor and time required to cover the seed with soil because the peatmoss functions as soil. However, the addition of water in the pelletization process causes the water to be absorbed into the seed which expands germ and endosperm. Finally the seed coat explodes and germinates. Drying in the process of storage after such physiological activation produces in the seed a physiological impediment to germination when sowing, and as a result , the germination rate drops. Therefore, in the pelletization process using peatmoss, the removal of water is a factor requiring serious consideration.

[0006] To solve this problem in the prior art, a method has been used wherein the surface of the plant seed coated with materials comprising mud, phosphate powder, lime powder and water-soluble Arabic gum severally by glue and dried. However, this method could not be used with all kinds of seed, especially bulbous plants, because

materials for growth such as fertilizer for growth, plant growth regulators, bactericides and insecticides do not work well together.

[0007] In order to solve the problem for the removal of water from the pellet, as mentioned hereinabove, the present invention prepares a pellet with a plant seed by mixing peatmoss and plant growth regulator etc., drying the mixture, making a hole to it, inserting a plant seed into the hole and sealing the hole to form a pellet. Accordingly, an object of the present invention is to provide a pelletization method of plant seed.

[0008] Another object of the present invention is to provide a pellet of plant seed produced by the pelletization method.

[0009] A further object of the present invention is to provide a plant cultivation method using the pellet with plant seed.

DISCLOSURE OF THE INVENTION

[0010] The present invention is achieved by pelleting a plant seed by adding various materials, sowing the pellet containing plant seed and confirming the excellent results of said pellet with plant seed by investigating the germination rate of the plant seed, the germination number, day by day, and the condition of growth.

[0011] The pelletization method of plant seed according to the present invention, comprises the steps of:

a) mixing one or more materials selected from the group consisting of fertilizer, plant growth regulator, bactericide and insecticide with peatmoss using a water-soluble glue to form a mixture;

b) forming the mixture of step a)for the insertion of a plant seed therein;

c) drying the mixture formed from step b); and

d) making a hole in said dried mixture, inserting the plant seed into said hold, and pressing and sealing the hole to obtain the resulting pellet with the plant seed inserted therein.

[0012] The steps of the pelletization of plant seed according to the present invention will be in detail described in more detail herein below.

STEP 1

[0013] One or more materials selected from the group consisting of fertilizer, plant growth regulator, bactericide and insecticide are mixed with peatmoss and water-soluble glue is added thereto. The fertilizer comprises N, P and K ingredients. The plant growth regulator comprises plant growth hormones, typically GA and NAA. The water-soluble glue is preferably a vegetative cement or can be an acryl cement. The peatmoss absorbed with water can be pressed under a wet condition.

STEP 2

[0014] The mixture thus obtained is pressed and formed into a pellet for the insertion of a plant seed. The size and shape of the pellet depends on the size and shape of the plant seed. The mixture can be pressed and formed by the wet peatmoss and water-soluble glue in the first step. FIG. 11 shows the pelletization process according to the present invention.

STEP 3

[0015] The pressed and formed mixture obtained from the second step is dried at 25.about.80.degree. C. At this time, a water content of the mixture is preferably 15.about.25% by weight. The drying method in the process of the present invention is preferably a hot wind drying method for mass production or a natural drying method. As the plant seed is inserted after drying, the germination of the plant seed from water absorbed into the peatmoss is prevented. Therefore, the problem that is described in the prior art is eliminated.

STEP 4

[0016] A hole is made in the dried mixture of the above step by a drill to insert the plant seed therein. Then the plant seed is inserted into the hole and the hole is pressed and sealed with peatmoss or the mixture of the first step. In the process of the present invention, a drill is used to make the hole. However, any device which can be used for mass production can be used.

[0017] The pelletization method of plant seed according to the present invention does not experience incidental chemical reaction during the mixing of various materials such as fertilizer, plant growth regulator, bactericide and insecticide with peatmoss. In addition, the forming is free and its process is convenient. Also in the present invention, the pellet containing plant seed does not undergo a physiological reaction with water. Furthermore, the pellet with plant seed, which is sown contains absorbed water and has 3 or 4 times the volume than in a drying condition and can be used in a large-scale cultivation because peatmoss functions as a soil. Therefore the pellet can be sown on the

soil surface. In addition, the pelletization method can be used for bulbous plants, which have not utilized the pelletization of plant seed.

[TABLE 1]

Comparison of the pelletization between the present invention and the Prior Art

	Pelletization method of the prior art	Pelletization method of the present invention
Target	Mainly micro plant seed	All kinds of plant seeds and bulbous plants
Purpose	Enlargement and uniformity for mechanization of sowing	Possibility of enlargement, uniformity, simplicity of cultivation and flight sowing.
Material	Mud, phosphate powder, lime powder, water-soluble Arabic gum	Peatmoss
Preparation and characteristic	1) Seed is prepared as a pellet by coating materials on its surface by using glue severally. 2) Expensive manufacturing equipments are needed.	1) Forming a mixture of additions and peatmoss, drying those, making a hole to said mixture, inserting plant seed into it, and pressing and sealing. 2) Preparation is very easy, simple manufacturing equipments are needed and it is possible to make it by hand.
Water drying	In the process of coating seed with various materials, wind or heat is used for drying, and the physiological activation problem happens because of water absorption into the seed in the preparing process.	The physiological activation problem does not happen because of forming using peatmoss and inserting the plant seed after drying.
Addition	It is possible to mix materials comprising fertilizer, plant growth regulator, bactericide, and insecticide, but to be happened inhibition effect by chemical reactions.	Such ingredients necessary for growth of plant seed as fertilizer, plant growth regulator, bactericide, and insecticide are easily mixed and there are no inhibition effects.

Physical and chemical characteristic	1) Aeration and moisture holding are not good. 2) The selection of material needs a caution because there is a possibility of incidental chemical reaction by coating materials.	1) Aeration and moisture holding is excellent. 2) Chemical inhibition reaction does not happen completely.
Sowing method	It is necessary to sow seed in the soil because pelletization materials do not function as a soil.	It is possible to sow seed in the soil surface as well as in the soil because peatmoss functions as a soil.
Hereafter possibility	Complement of defects is needed according to materials and applied plant seed.	It is possible to be applied widely in all kinds of plant seeds and bulbous plants. Also it can be practiced as soon as possible.

[0018] The present invention will be explained in more detail with reference to the below examples and experimental examples. However, it should be understood that the scope of the present invention is not limited thereto.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019] The patent or application file contains at least one drawing executed in color. Copies of this patent or patent application publication with color drawing(s) will be provided by the Office upon request and payment of the necessary fee.

[0020] Figure 1a is a graph that shows a germination rate on the first experiment according to various pelletization methods and sowing methods (experimental examples 1.about.8) in Calendula officinalis cv. Gold star seed;

[0021] Figure 1b is a graph that shows a germination rate on the second experiment according to various pelletization methods and sowing methods (experimental examples 1.about.8) in Calendula officinalis cv. Gold star seed;

[0022] Figure 2a is a graph that shows a germination rate on the first experiment according to various pelletization methods and sowing methods (experimental examples 1.about.8) in Salvia splendens cv. Hot jazz seed;

[0023] Figure 2b is a graph that shows a germination rate on the second experiment according to various pelletization methods and sowing methods (experimental examples 1.about.8) in Salvia splendens cv. Hot jazz seed;

[0024] Figure 3 is a graph that shows a germination rate according to various pelletization methods and sowing methods (experimental examples 1.about.8) in Glycine max cv. Whanggeum seed;

[0025] Figure 4a is the first experiment graph that shows a change of germination population after sowing according to sowing methods in Calendula officinalis cv. Gold star seed that is not palletized;

[0026] Figure 4b is the first experiment graph that shows a change of germination population after sowing according to sowing methods in Calendula officinalis cv. Gold star seed with fertilizer-treatment only.

[0027] Figure 4c is the first experiment graph that shows a change of germination population after sowing according to sowing methods in Calendula officinalis cv. Gold star seed that is treated with fertilizer and GA;

[0028] Figure 4d is the first experiment graph that shows a change of germination population after sowing according to sowing methods in Calendula officinalis cv. Gold star seed that is treated with fertilizer and NAA;

[0029] Figure 5a is the second experiment graph that shows a change of germination population after sowing according to sowing methods in Calendula officinalis cv. Gold star seed that is not palletized;

[0030] Figure 5b is the second experiment graph that shows a change of germination population after sowing according to sowing methods in Calendula officinalis cv. Gold star seed with fertilizer-treatment only;

[0031] Figure 5c is the second experiment graph that shows a change of germination population after sowing according to sowing methods in Calendula officinalis cv. Gold star seed that is treated with fertilizer and GA;

[0032] Figure 5d is the second experiment graph that shows a change of germination population after sowing according to sowing methods in Calendula officinalis cv. Gold star seed that is treated with fertilizer and NAA;

[0033] Figure is the first experiment graph that shows a change of germination population after sowing according to sowing methods in Salvia splendens cv. Hot jazz seed that is not palletized;

[0034] Figure 6b is the first experiment graph that shows a change of germination population after sowing according to sowing methods in Salvia splendens cv. Hot jazz seed with fertilizer-treatment only;

[0035] Figure 6c is the first experiment graph that shows a change of germination population after sowing according to sowing methods in Salvia splendens cv. Hot jazz seed that is treated with fertilizer and GA;

[0036] Figure 6d is the first experiment graph that shows a change of germination population after sowing according to sowing methods in Salvia splendens cv. Hot jazz seed that is treated with fertilizer and NAA;

[0037] Figure 7a is the second experiment graph that shows a change of germination population after sowing according to sowing methods in Salvia splendens cv. Hot jazz seed that is not palletized;

[0038] Figure 7b is the second experiment graph that shows a change of germination population after sowing according to sowing methods in Salvia splendens cv. Hot jazz seed with fertilizer-treatment only;

[0039] Figure 7c is the second experiment graph that shows a change of germination population after sowing according to sowing methods in Salvia splendens cv. Hot jazz seed that is treated with fertilizer and GA;

[0040] Figure 7d is the second experiment graph that shows a change of germination population after sowing according to sowing methods in Salvia splendens cv. Hot jazz seed that is treated with fertilizer and NAA;

[0041] Figure 8a is an experiment graph that shows a change of germination population after sowing according to sowing methods in Glycine max cv. Whanggeum seed that is not palletized;

[0042] Figure 8b is an experiment graph that shows a change of germination population after sowing according to sowing methods in Glycine max cv. Whanggeum seed with fertilizer-treatment only;

[0043] Figure 8c is an experiment graph that shows a change of germination population after sowing according to sowing methods in Glycine max cv. Whanggeum seed that is treated with fertilizer and GA;

[0044] Figure 8d is an experiment graph that shows a change of germination population after sowing according to sowing methods in Glycine max cv. Whanggeum seed that is treated with fertilizer and NAA;

[0045] Figure 9 is a photograph shows comparison of a pelletization between plant seeds and bulbous plants;

[0046] Figure 10 is a photograph shows a pelletization of plant seed;

[0047] Figure 11 is a photograph shows a sowing state of the pellet with plant seed according to the present invention;

[0048] Figure 12a is a photograph of the first experiment that shows a growth state of the pellet of Calendula officinalis cv. Gold star seed prepared by experimental examples 1.about.8 in two months after sowing;

[0049] Figure 12b is a photograph of the second experiment that shows a growth state of the pellet of Calendula officinalis cv. Gold star seed prepared by experimental examples 1.about.8 in two months after sowing;

[0050] Figure 13a is a photograph of the first experiment that shows a growth state of the pellet of Salvia splendens cv. Hot jazz seed prepared by experimental examples 1.about.8 in two months after sowing;

[0051] Figure 13b is a photograph of the second experiment that shows a growth state of the pellet of Salvia splendens cv. Hot jazz seed prepared by experimental examples 1.about.8 in two months after sowing;

[0052] Figure 14 is a photograph of the first experiment that shows a growth state of the pellet of Glycine max cv. Whanggeum seed prepared by experimental examples 1.about.8 in two months after sowing;

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0053] To compare and analyze the effect of the pelletization using peatmoss, fertilizer and plant growth regulator, the pellets of Calendula officinalis cv. Gold star, Salvia splendens cv. Hot jazz, and Glycine max cv. Whanggeum seeds were prepared by pelletization method mentioned hereinabove. Then, many growth states comprising germination rate, germination number day by day after sowing, plant height and leaf length were studied with the statistics noted and analyzed.

[0054] The first experiment was carried out from April 2002 to June 2002, and the second experiment was carried out from May 2002 to July 2002. The seeds of Calendula officinalis cv. Gold star and Salvia splendens cv. Hot jazz were carried out the first and the second experiments, and the seed of Glycine max cv. Whanggeum was carried out the first experiment only. The sowing was conducted in a rectangle plastic box for cutting by using clay sand. Intermediate fertilizer was not applied at all, and only watering was carried out as demanded. The processes were carried out 3 times repeatedly to one hundred of every seed.

[0055] Also, the planting of the prepared pellet was conducted by two sowing methods; one is a sowing method wherein it is not necessary to cover the seed with earth after sowing the seed on the soil surface and the other is a sowing method where it is necessary to cover the seed with earth.

[0056] The shape of the pellet depends on size and shape of the plant seed; however, the pellets in the below examples were made with a spherical shape for a convenience of experiment. Pelletization treatment and planting method were carried out as follows.

EXAMPLE 1

[0057] The every seed of Calendula officinalis cv. Gold star, Salvia splendens cv. Hot jazz, and Glycine max cv. Whanggeum was not pelletized and planted by a method of sowing seed in the soil surface.

EXAMPLE 2

[0058] Pellets, which were prepared by adding fertilizer ingredients consisting of 300 mg/L of N, 200 mg/L of P and 400 mg/L of K with peatmoss, adjusting as pH 5.8, adding a water-soluble glue, forming said mixture, inserting the Calendula officinalis cv. Gold star, Salvia splendens cv. Hot jazz, and Glycine max cv. Whanggeum seeds into it and then pressing them to a spherical shape were planted by the method of sowing seed in the soil surface.

EXAMPLE 3

[0059] Pellets, which were prepared by adding fertilizer ingredients consisting of 300 mg/L of N, 200 mg/L of P and 400 mg/L of K and 300 ppm of GA with peatmoss, adjusting as pH by 5.8, adding a water-soluble glue, forming said mixture, inserting the Calendula officinalis cv. Gold star, Salvia splendens cv. Hot jazz, and Glycine max cv.

Whanggeum seeds into it and then pressing them to a spherical shape were planted by the method sowing seed in the soil surface.

EXAMPLE 4

[0060] Pellets, which were prepared by adding fertilizer ingredients consisting of 300 mg/L of N, 200 mg/L of P and 400 mg/L of K and 300 ppm of NAA with peatmoss, adjusting as pH 5.8, adding a water-soluble glue, forming said mixture, inserting the Calendula officinalis cv. Gold star, Salvia splendens cv. Hot jazz, and Glycine max cv. Whanggeum seeds into it and then pressing them to a spherical shape were planted by the method sowing seed in the soil surface.

EXAMPLE 5

[0061] The every seed of Calendula officinalis cv. Gold star, Salvia splendens cv. Hot jazz, and Glycine max cv. Whanggeum was not pelletized and planted by a method sowing seed in the soil.

EXAMPLE 6

[0062] Pellets, which were prepared by adding fertilizer ingredients consisting of 300 mg/L of N, 200 mg/L of P and 400 mg/L of K with peatmoss, adjusting as pH 5.8, adding a water-soluble glue, forming said mixture, inserting the Calendula officinalis cv. Gold star, Salvia splendens cv. Hot jazz, and Glycine max cv. Whanggeum seeds into it and then pressing them to a spherical shape were planted by the method sowing seed in the soil.

EXAMPLE 7

[0063] Pellets, which were prepared by adding fertilizer ingredients consisting of 300 mg/L of N, 200 mg/L of P and 400 mg/L of K and 300 ppm of GA with peatmoss, adjusting as pH 5.8, adding a water-soluble glue, forming said mixture, inserting the Calendula officinalis cv. Gold star, Salvia splendens cv. Hot jazz, and Glycine max cv. Whanggeum seeds into it and then pressing them to a spherical shape were planted by the method sowing seed in the soil.

EXAMPLE 8

[0064] Pellets, which were prepared by adding fertilizer ingredients consisting of 300 mg/L of N, 200 mg/L of P and 400 mg/L of K and 300 ppm of NAA with peatmoss, adjusting as pH 5.8, adding a water-soluble glue, forming said mixture, inserting the Calendula officinalis cv. Gold star, Salvia splendens cv. Hot jazz, and Glycine max cv. Whanggeum seeds into it and then pressing them to a spherical shape were planted by the method sowing seed in the soil.

[TABLE 2]

Preparation of pellet by examples 1~8

Example	Fertilizer (mg/L)	Plant growth regulator	Peatmoss	pH	Sowing method
1	No	No	No	5.8	Sowing seed in the soil surface
2	N; 300 P; 200 K; 400	No[1)]	Pressing to a spherical shape after treatment	5.8	Sowing seed in the soil surface
3	N; 300 P; 200 K; 400	GA[2)] 300ppm	Pressing to a spherical shape after treatment	5.8	Sowing seed in the soil surface
4	N; 300 P; 200 K; 400	NAA[3)] 300ppm	Pressing to a spherical shape after treatment	5.8	Sowing seed in the soil surface
5	No	No	No	5.8	Sowing seed in the soil
6	N; 300 P; 200 K; 400	No	Pressing to a spherical shape after treatment	5.8	Sowing seed in the soil.
7	N; 300 P; 200 K; 400	GA 300ppm	Pressing to a spherical shape after treatment	5.8	Sowing seed in the soil
8	N; 300 P; 200 K; 400	NAA 300ppm	Pressing to a spherical shape after treatment	5.8	Sowing seed in the soil

[Footnote]
[1)] No ; no pelletization
[2)] GA ; Giberellin
[3)] NAA ; Naphthalene acetic acid

[TABLE 3]

Growth difference in the pellet of *Calendula officinalis* cv. Gold star seed treated by method of examples 1~8

Example	No. of leaves	Leaf length (cm)	Leaf width (cm)	Plant height (cm)	Root length (cm)	Fresh weight (g)	No. of flowers
The first experiment							
1	5.90 c[1)]	3.36 d	0.93 d	7.69 cd	6.95 bc	1.65 ab	0.07 ab
2	9.12 b	9.69 a	2.37 a	11.82 b	9.96 a	2.05 a	0.00 b
3	13.02 a	7.25 b	1.94 b	15.92 a	7.47 b	1.98 ab	0.00 b
4	0.83 e	0.81 f	0.23 e	1.97 f	3.07 e	1.51 b	0.14 a
5	5.84 c	4.05 d	1.54 c	6.48 d	6.13 cd	0.15 d	0.00 b
6	6.38 c	7.61 b	2.12 ab	8.95 c	7.03 bc	1.60 ab	0.00 b
7	8.86 b	4.95 c	1.37 c	8.79 c	5.33 d	0.67 c	0.00 b
8	2.05 d	1.51 e	0.44 e	4.40 e	2.84 e	1.80 ab	0.00 b
The second experiment							
1	1.27 d	1.30 c	0.41 d	2.41 e	1.30 d	0.11 c	0.00 b
2	7.84 a	6.46 a	1.55 a	10.94 c	12.40 a	3.49 b	0.00 b
3	8.64 a	6.19 a	1.82 a	16.59 a	12.36 a	3.55 a	0.02 b
4	0.00 e	0.00 d	0.00 e	0.00 f	0.00 d	0.00 c	0.00 b
5	4.34 c	4.29 b	1.01 c	7.40 d	7.23 c	0.57 c	0.00 b
6	6.20 b	5.81 a	2.15 b	12.85 b	8.36 c	2.93 b	0.05 a
7	5.45 b	6.31 a	1.59 b	13.36 b	10.66 b	2.76 b	0.00 b
8	0.09 e	0.12 d	0.01 e	0.18 f	0.10 d	0.01 c	0.00 b

[Footnote]
[1)] Mean separation within columns by Duncan's multiple range test at p=0.05.

[TABLE 4]

Growth difference in the pellet of *Salvia splendens* cv. Hot jazz seed treated by method of examples 1~8

Example	No. of leaves	Leaf length (cm)	Leaf width (cm)	Plant height (cm)	Root length (cm)	Fresh weight (g)	No. of flowers
The first experiment							
1	0.67 d[1)]	0.25 d	0.22 c	2.33 d	2.33 d	0.57 c	0.00 b
2	7.06 a	3.95 a	3.39 a	19.58 a	18.28 a	5.94 a	0.00 b
3	5.73 b	4.26 a	3.34 a	18.11 a	11.73 b	4.95 b	0.10 a
4	3.15 c	2.00 bc	1.66 b	7.80 b	5.29 c	1.46 c	0.04 b
5	4.96 b	1.44 cd	1.30 b	7.36 bc	10.60 b	1.07 c	0.00 b
6	2.46 c	3.16 ab	1.26 b	4.62 cd	4.88 c	1.45 c	0.00 b

7	3.04 c	1.90 bc	1.37 b	5.12 bcd	3.88 cd	1.13 c	0.00 b
8	1.08 d	0.67 cd	0.53 c	3.41 d	2.27 d	1.19 c	0.00 b
The second experiment							
1	3.43 c	1.33 c	0.81 c	3.41 c	4.92 c	0.17 bc	0.00 b
2	1.48 d	1.03 cd	0.60 c	2.69 c	1.79 d	0.57 b	0.00 b
3	7.14 a	6.31 a	2.68 a	15.46 a	12.57 b	2.24 a	0.00 b
4	0.00 e	0.00 d	0.00 d	0.00 d	0.00 d	0.00 c	0.00 b
5	4.60 b	1.15 cd	0.61 c	3.26 c	4.79 c	0.13 bc	0.00 b
6	0.24 e	0.25 cd	0.14 d	0.18 d	0.22 d	0.20 bc	0.02 b
7	3.60 c	3.04 b	1.80 b	6.96 b	14.64 a	2.55 a	0.24 a
8	0.00 e	0.00 d	0.00 d	0.00 d	0.00 d	0.00 c	0.00 b

[Footnote]
[1)] Mean separation within columns by Duncan's multiple range test at p=0.05.

[TABLE 5]

Growth difference in the pellet of *Glycine max* cv. Whanggeum seed treated by method of examples 1~8

Example	No. of leaves	Leaf length (cm)	Leaf width (cm)	Plant height (cm)	Root length (cm)	Fresh weight (g)	No. of flowers	No. of pods
1	0.81 d[1)]	2.76 f	1.81 f	6.82 f	6.08 e	1.68 b	0.71 e	0.00 c
2	4.06 bc	14.64 b	9.37 bc	47.22 d	19.24 b	9.74 b	2.55 bc	0.06 c
3	4.60 ab	12.09 c	8.58 bc	57.52 ab	14.20 c	6.57 b	1.48 d	0.61 a
4	1.27 d	4.34 e	3.06 e	11.04 f	6.87 e	4.48 b	0.90 e	0.06 c
5	4.28 bc	15.61 b	12.11 a	53.78 bc	22.94 a	5.42 b	2.82 ab	0.42 ab
6	5.07 ab	17.83 a	11.09 a	63.95 a	21.70 ab	11.00 b	3.43 a	0.29 b
7	3.47 c	8.38 d	6.13 d	47.57 cd	15.67 c	3.64 b	1.60 d	0.41 b
8	3.66 c	12.63 c	7.74 cd	37.00 e	10.33 d	22.40 a	2.39 c	0.48 ab

[Footnote]
[1)] Mean separation within columns by Duncan's multiple range test at p=0.05.

[0065] Effects of the pellet with plant seed according to the present invention are as follows;

[0066 The pelletization treatment for the seeds of Calendula officinalis cv. Gold star, Salvia splendens cv. Hot jazz, and Glycine max cv. Whanggeum resulted in a far better growth than the control in number of leaves, leaf length, leaf width, plant height and root length etc. (Table 3, 4, 5). The germination rate of the palletized seeds was similar to the control (FIG. 1a, 1b, 2a, 2b, 3), however, the pelletization treatment improved the growth state of plant seed after germination than the control because of fertilizing ingredients mixed with peatmoss. Therefore, in the case of Calendula officinalis cv. Gold star, number of leaves and plant height were more than twice than the control (Table 3). Particularly, Glycine max cv. Whanggeum had four times number of leaves and nine times plant height than the control (Table 5). The reason is judged as follows; the peatmoss, which is light and has an excellent aeration provides the oxygen supply necessary for smooth germination, the water potential of said peatmoss that is more than 60% of total volume makes seed sufficiently wet and an absorption of mixed fertilizer makes nutrient supply smooth.

[0067] In comparison the growth of the pellet with plant seed of the present invention according to sowing methods, in the cases of the pellets of Calendula officinalis cv. Gold star seed and Salvia splendens cv. Hot jazz seed, the state of growth of those seeds sown in the soil surface (Example 1.about.4) was more excellent than the seeds sown in the soil in almost all respects (Table 3, 4, 5). The state of growth of Glycine max cv. Whanggeum seed was similar according to sowing methods; the reason is thought as an effect by supply of nitrogen ingredient carried out by leguminous bacteria in a root of

bean (Table 5). In the treatment of sowing seed in the soil surface, the germination rate was high (FIG. 1, 2, 3) and a germinating day was quick (FIG. 5, 6, 7, 8). The reason of said characteristics is that the peatmoss surrounding the pellet of plant seed sown in the soil surface substitutes for soil sufficiently, as a result of that, the plant seed is germinated normally as if it were in the soil.

[0068] In comparison the growth of the present invention according to plant growth regulators treated with seeds, in the cases of the pellets of Calendula officinalis cv. Gold star seed and Salvia splendens cv. Hot jazz seed, the growth state of the seeds treated with GA was more excellent than the plants treated with NAA (Table 3, 4). In the case of the pellet of Glycine max cv. Whanggeum, the plant height of the seeds treated with GA, which had been sown in the soil surface was five times as long as that of seeds treated with NAA and said result showed a complete physiological characteristic of GA. In the sowing seed in the soil, some seeds treated with NAA had more excellent results but the reason of said results is thought as the effect of leguminous bacteria (Table 5). Also, in the germination number, the pellets of Calendula officinalis cv. Gold star seed and Salvia splendens cv. Hot jazz seed were that the seeds treated with GA had a higher number than the seeds treated with NAA (FIG. 1, 2). However, the pellet of Glycine max cv. Whanggeum seed showed a similar result compared with the case of sowing seed in the soil between the seed treated with GA and the seed treated with NAA (FIG. 3). The germinating day of the pellet of Glycine max cv. Whanggeum seed showed a similar tendency to the germination number (FIG. 1, 2, 3). Said results indicat9XGA causes a diapauses breaking of plant seed, the germination, stem growth and flowering and NAA causes a rooting reaction.

[0069] In said examples, the pellet added fertilizer and the pellet added fertilizer and GA showed far excellent growth states and the facts mentioned above are thought on account of fertilizing ingredients mixed with the pellet and a supply of GA. In the present invention, the sowing method of the pellet of plant seed is effective when it is carried out in the soil surface and in the case of Glycine max cv. Whanggeum seed, the sowing seed in the soil is effective.

[0070] In synthesis of the results mentioned above, the pelletization of plant seed according to the present invention improved the growths of seed comprising germination rate, germination after planting and germinating day etc. when compared to the control, the sowing method in the soil surface was effective than the sowing method in the soil and GA as plant growth regulator resulted in an excellent growth. Therefore, the superiority of the present invention is proved by these results.

INDUSTRIAL APPLICABILITY

[0071] As explanations mentioned hereinabove, the pelletization method of plant seed according to the present invention by mixing materials consisting of fertilizer, plant growth regulator with peatmoss, drying said mixture and inserting the plant seed into the mixture, has no problem of chemical reaction in the process. And pellets with plant seed prepared by the present method prevents physiological reaction of seed by the removal of water within a pellet, whereby the growth of the plant after germination is remarkably excellent. In addition, the present invention can be used for bulbous plants and makes large-scale Air sowing possible because the germination rate of the pelletized seed is high without the need of covering with earth again after sowing the seed on the soil surface.